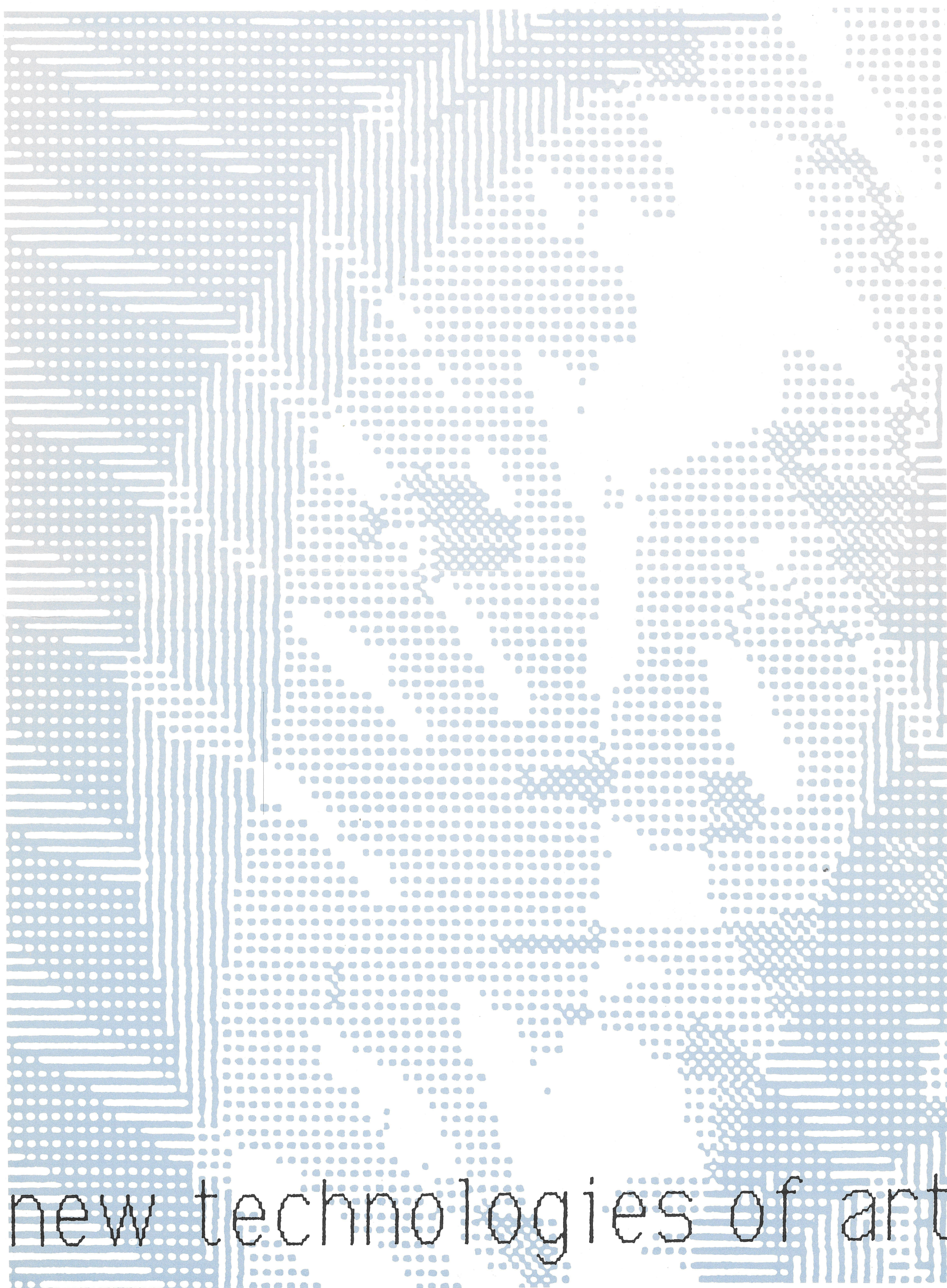


UTAH ARCHITECT

graduate school of architecture utah society, aia



new technologies of art

fall 1985

editor's notes

cover: by Joan Truckenbrod

This issue of **Utah Architect** previews a conference entitled, **New Technologies of Art**. The conference is an ambitious project for a newly formed organization. The Contemporary Arts Group organized in 1984 to stimulate interest in the most advanced visual art and architecture of our time and to help create a climate in which these arts could flourish. In the past year they have presented exciting programs by some of the most original artists and critics of the current art scene. Their presentations have challenged conventional ideas of the role of the artist and the way we see. Exploring the liason between art and science is not a new concept. Historic precedents extend back to Leonardo da Vinci. Art has generally made use of available technology and reflected some of the concerns of scientific thought. At times artist and inventor have combined in one personality, although we recognize that the technological innovations of Samuel F. B. Morse and Robert Fulton had greater impact on society than their artistic achievements. The growing pressures of specialization have inspired many idealistic efforts to bridge the gap. Gyorgy Kepes, pioneer educator, painter and photographer founded the Center for Advanced Visual Studies (C.A.V.S.) at M.I.T. in 1967. He sought a forum where talented artists, scientists and engineers could develop

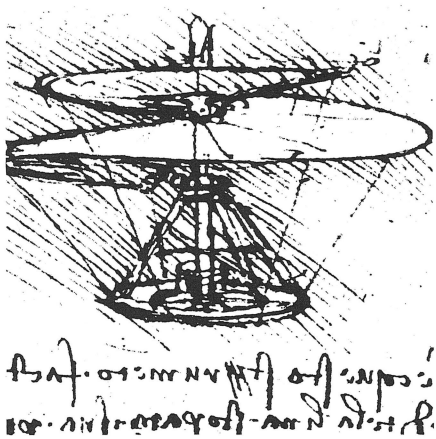
their collective insights for the benefit of architecture and the urban environment. Another development of the 1960's was the organization of Experiments in Art and Technology (E.A.T.) to create access for artists to new developments in science and technology. Both E.A.T. and C.A.V.S. are creative forces today although many organizations have joined them. Recent biennials of art at the Whitney Museum and in Venice have portrayed a finite world of diminishing scope. Comic strips, graffiti, appropriations of existing images and literal copying of early classic figures have momentary interest but suggest an ultimate deadend. They also reflect the tremendous pressures artists, and architects too, face for a day in the media. The "cutting edge" in art and design is a fashionable cliché. We may well ask, "Where are the real frontiers in art and design today?" The artists of this conference point to another direction with wider horizons. The popular expression, "The sky's the limit" has been extended to outer space, the undersea world of Jacques Cousteau and the unseen worlds of archeology and electronic circuits. In their statements they express the excitement of ideas at the intersections of various disciplines and they often have mastery of several. They also reaffirm the importance of

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Richard Loosle
Eric Migacz



human values and using technological tools as vehicles for the creative vision of the artist. A conference is in one sense a happening, very much dependent on the interactions of individuals. At best it can inform, stimulate and challenge the participants. We also hope it will be a pleasurable experience. Enjoy it! Anna Campbell Bliss, Conference Chairman

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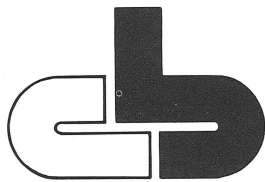
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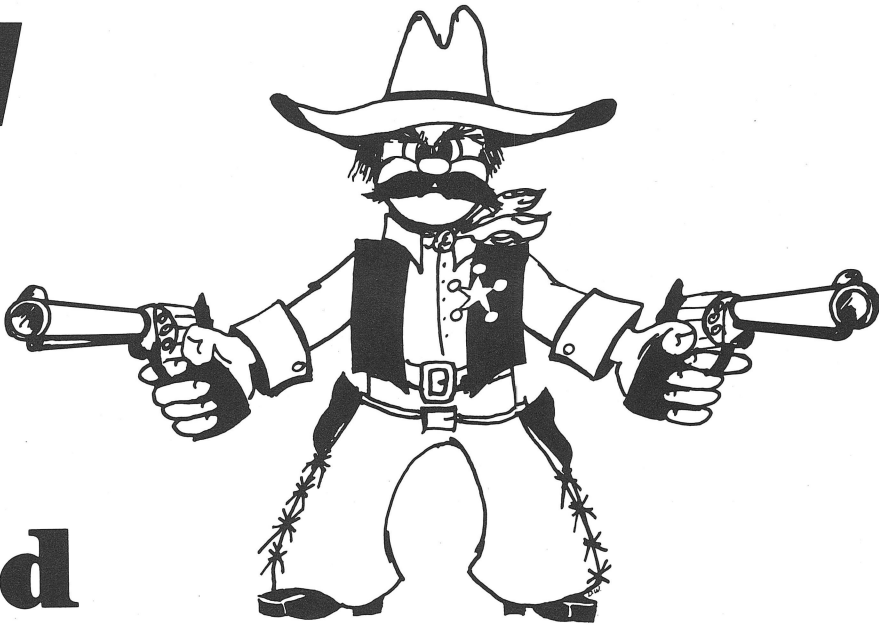
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new technologies of art

“where art and science meet”

Conference October 25-26, 1985
University of Utah Salt Lake City, Utah
A Program of The Contemporary Arts Group

Friday, October 25

Kingsbury Hall

8:00 P.M.

“Art and Nature in the Technology of Flight”

Paul MacCready Developer of human-powered flight, Scientist, Inventor

Saturday, October 26

Arts and Architecture Auditorium

8:00 A.M.

Final Registration

8:45

Introductions

9:00

“Electronic Imaging”

Ed Emshwiller, Artist,
Dean, School of Film and Video,
Provost, California Institute of the Arts

9:40

“Creative Computer Imaging”

Joan Truckenbrod, Artist,
Head Art & Technology,
The School of the Art Institute of Chicago

10:20

“CAD Systems and Beyond”

Steven Gregory, Consultant, President,
New England Technology Group

11:00

Discussion and Coffee Break

11:20

“Graphics in Space”

April Greiman, Artist

12:00

Bailey Exhibition Hall — Box Lunch

Video Presentation by Utah Media Center

Artists: David Hays, Ian Bigelow,
John Sturgeon, Aysha Quinn,
Dan Reeves, Bill Simonett

Equipment Demonstrations

1:15 P.M.

Introductions

1:20

“15 Ways of Generating Color”

Dr. Kurt Nassau, Research Scientist,
Bell Laboratories

2:00

“Ionized Gases as an Art Form”

Larry Albright, Artist

2:30

“Holographic Environments, A New Reality”

Friedrich St. Florian, Artist,
Dean of Architecture,
Rhode Island School of Design

3:10

Discussion and Coffee Break

3:20

“Neon Art”

Artist to be confirmed

3:50

“Art/ Science/ Technology”

Otto Piene, Artist, Director Center for
Advanced Visual Studies, M.I.T.

4:30 - 5:10

“Building with Time and Light”

Dale Eldred, Artist

5:30

Reception to meet the speakers, Art Barn

Co-sponsors: Graduate School of Architecture, Departments of Art and Computer Science, University of Utah and Utah Arts Council

The conference has been made possible by a grant from the National Endowment for the Arts and matching funds from Utah professional and business organizations.

april greiman

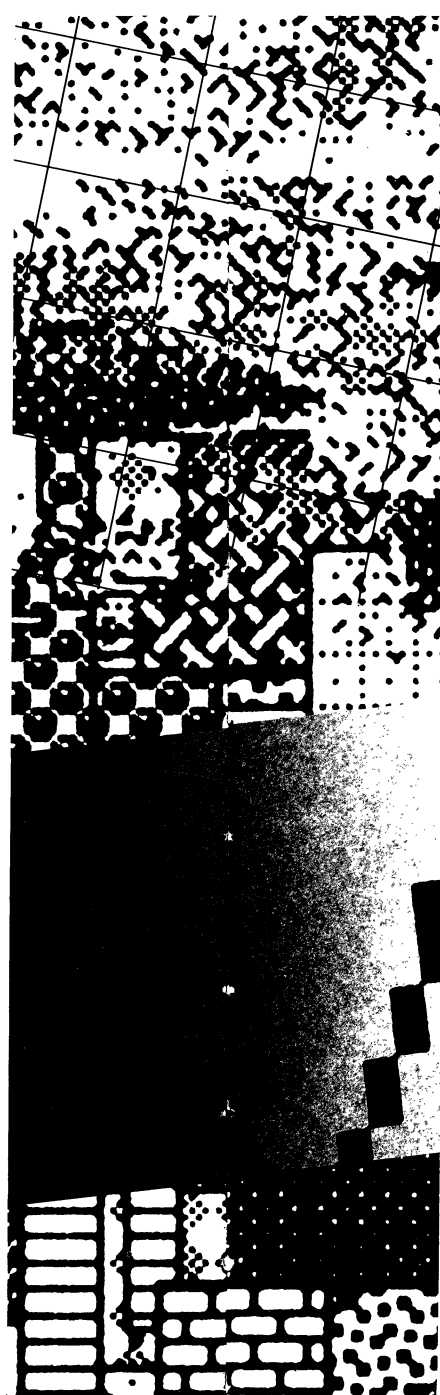
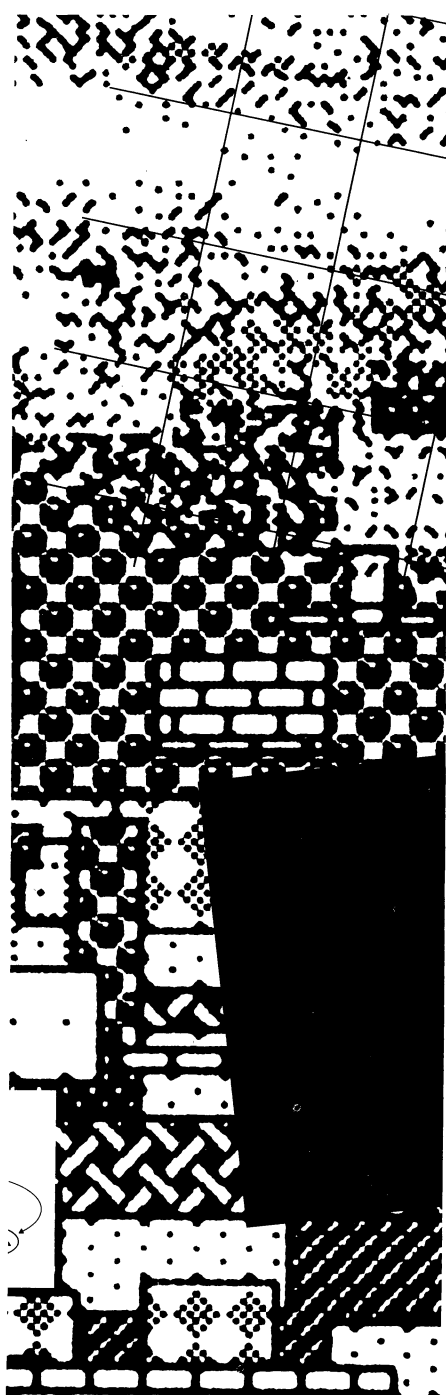
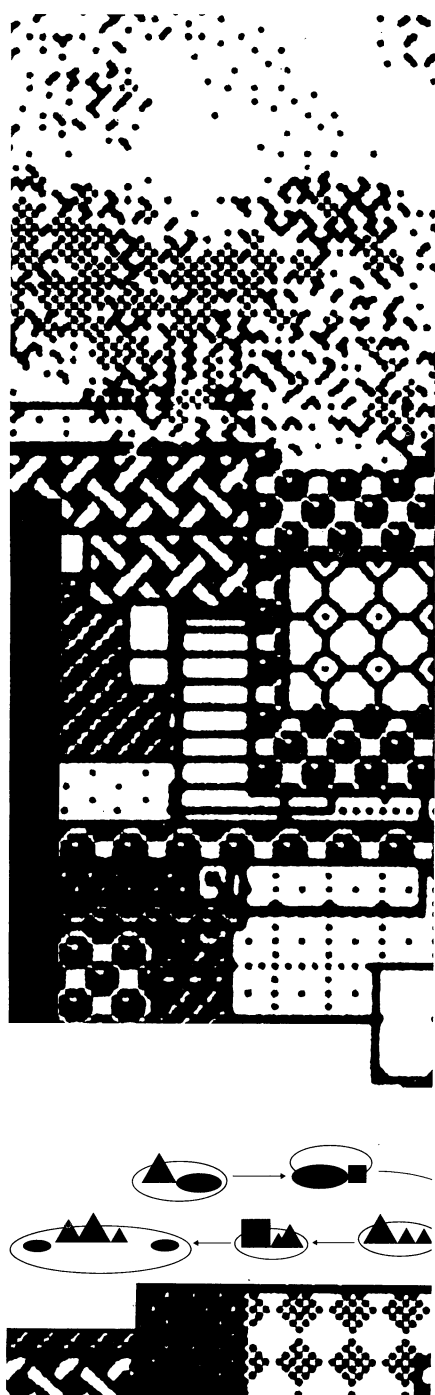
graphics in space

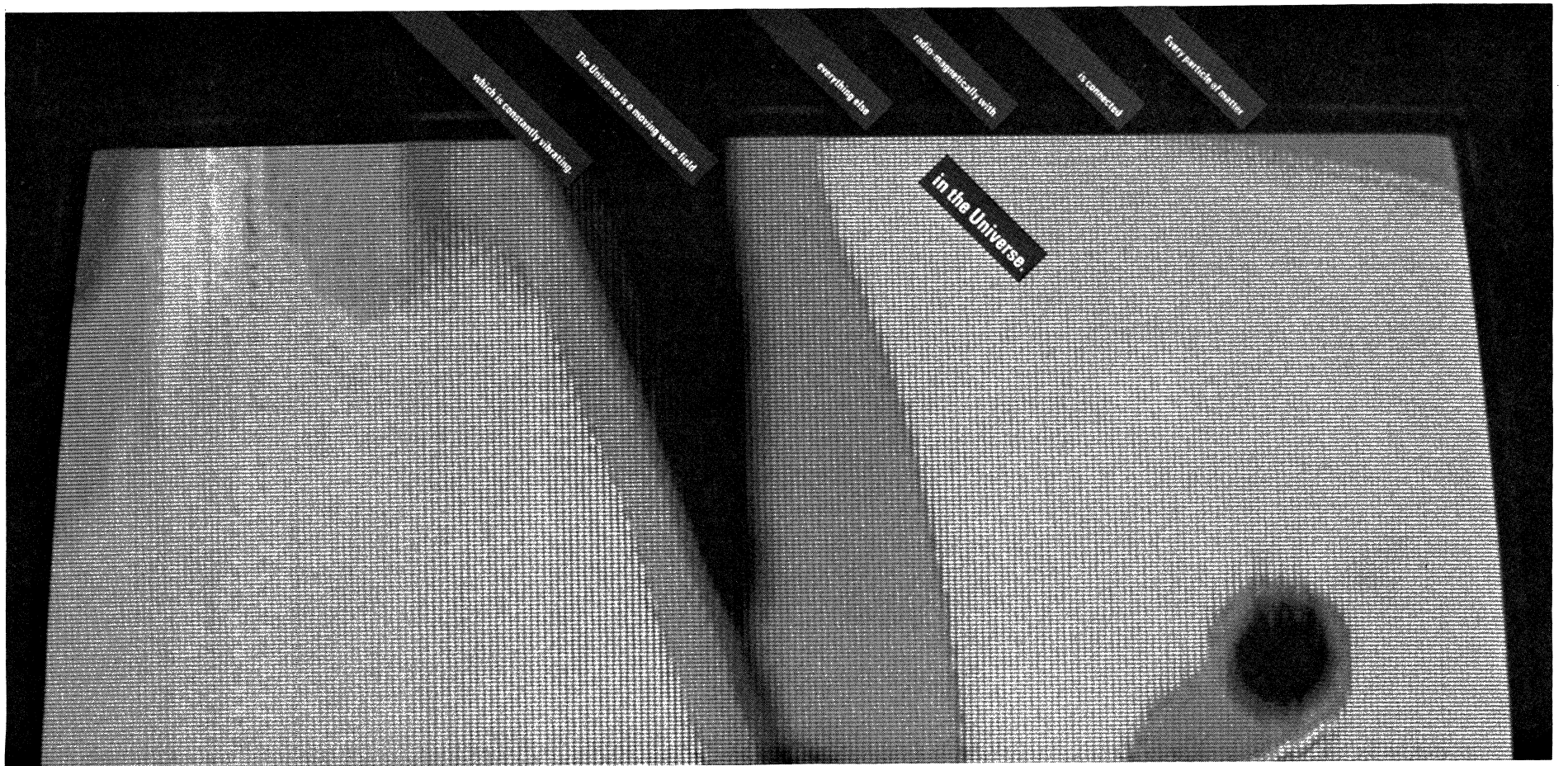
APRIL GREIMAN, explores the frontiers of graphics as head of her own firm, clients include Esprit de Corp, Cal Arts and the 1984 Olympics.

Greiman has influenced contemporary graphics through her imaginative use of typography and photographic illustration. In her designs the printed page is projected into a new realm of dynamic space.

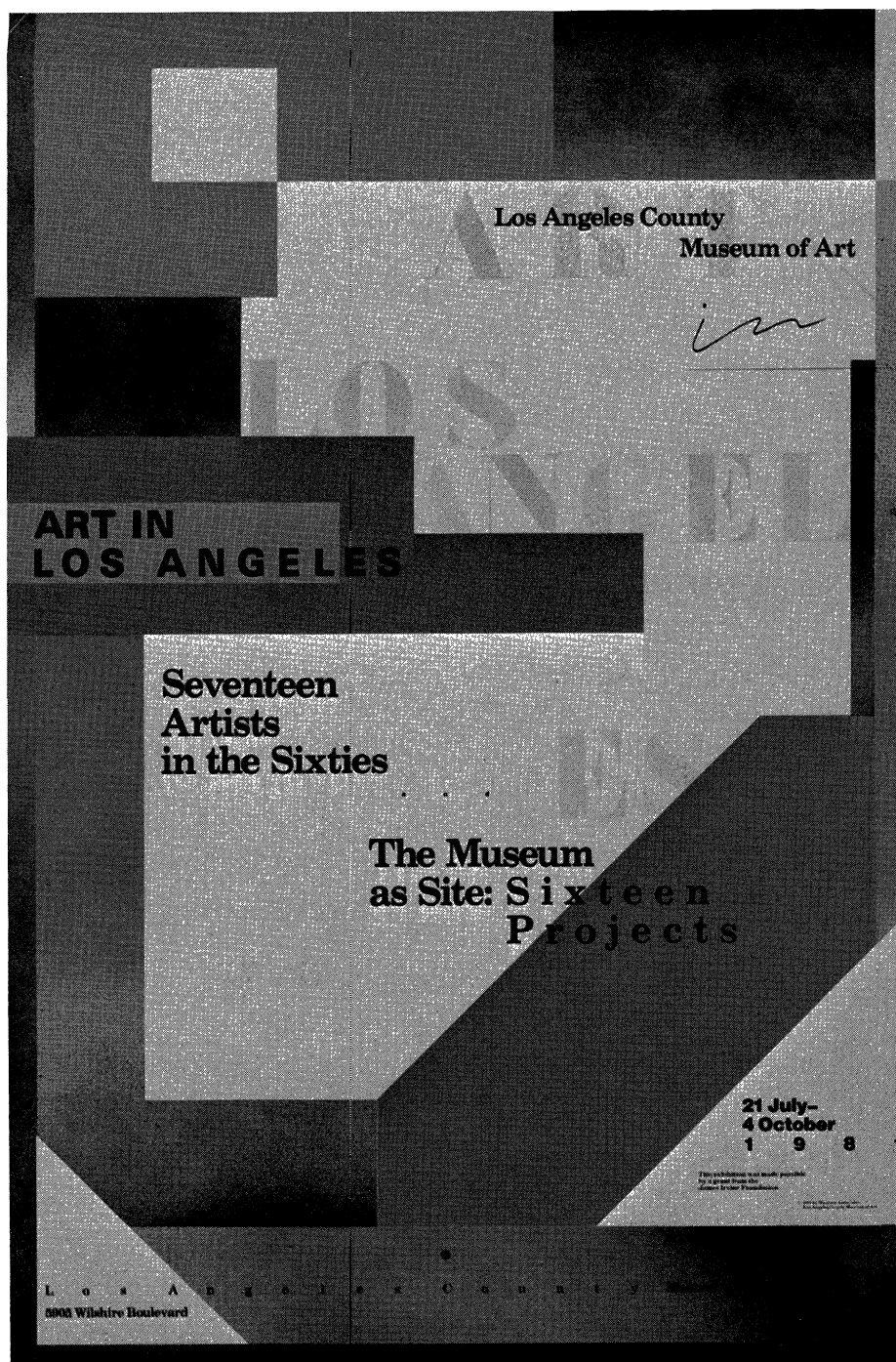
She studied design at the Kansas City Art Institute and later with Armin Hofmann and Wolfgang Weingart in Basel, Switzerland. Teaching experience includes the Philadelphia College of Art and more recently Director of Visual Communications at the California Institute of the Arts.

Ms. Greiman's work is widely published in ARTFORUM, TIME, PROGRESSIVE ARCHITECTURE and many others. Her work is included in the collections of the Cooper-Hewitt Museum, Library of Congress, Museum of Modern Art, Swiss National Print Collection and various other institutions.

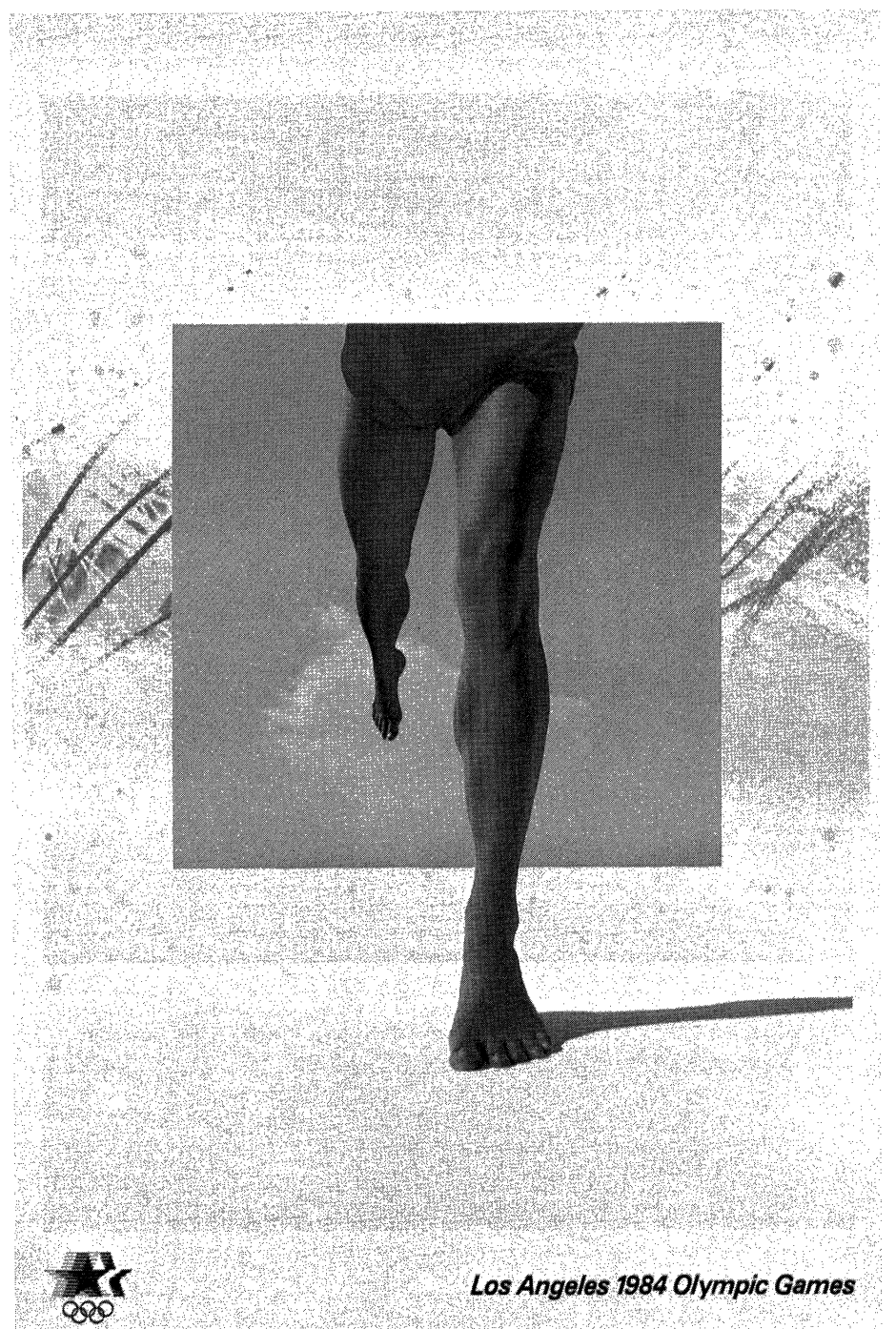




from Hybrid image, California Institute of the Arts, 1983



Los Angeles County Museum of Art, Museum as Site 1981



Los Angeles 1984 Olympic Games

Collaborative poster with Jayme Odgers for 1984 Olympic Games, 1983

fredrich st. florian

holographic environments, a new reality

FRIEDRICH ST. FLORIAN, artist and Dean of Architecture, Rhode Island School of Design, creates imaginary architecture using lasers and holograms.

His recent American Academy in Rome Fellowship followed M.I.T., Fulbright and NEA. St. Florian's visionary designs have been included in many museum shows here and abroad.

In 1968 I began to work towards the conception of an "imaginary architecture," an architecture that is non-physical, that may be switched on and switched off, transparent, illusive, magnificent.

At first, it seems to be an impossible dream. It is all too soon apparent that the laws of physics do not allow analogous models that are totally extinguishable. Yet there is evidence today, particularly among the new sciences, that we are at the threshold of an extraordinary extension of human boundaries.

Arnold Toynbee speaks of "etherealization," the dematerialization of human concern. We have learned to live in an ambience where the world of real experience, the world of images, the world of concepts have become interchangeable, where reality has become a matter of choice.

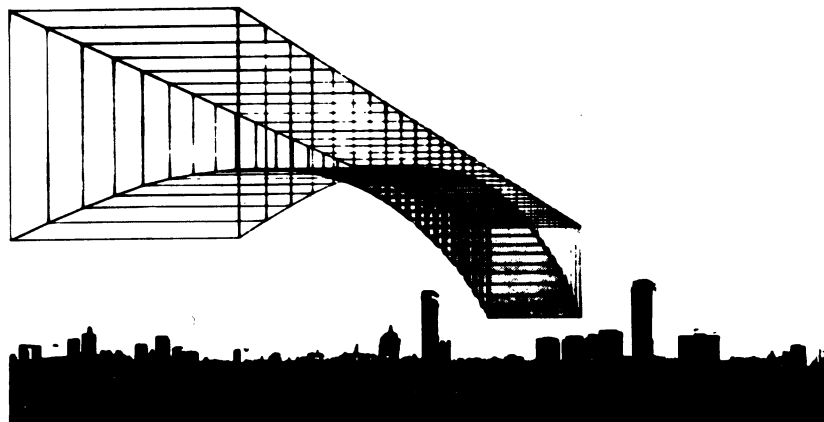
However, the newer realities do not threaten the reality that we know best; nor will they replace the world or real experience. It is as if one would switch from a piano with one keyboard to another that has two or more.

My first encounter with the notion of an imaginary architecture came in 1969 when I was invited to Stockholm to build an "Imaginary Room" at the Moderna Museet.

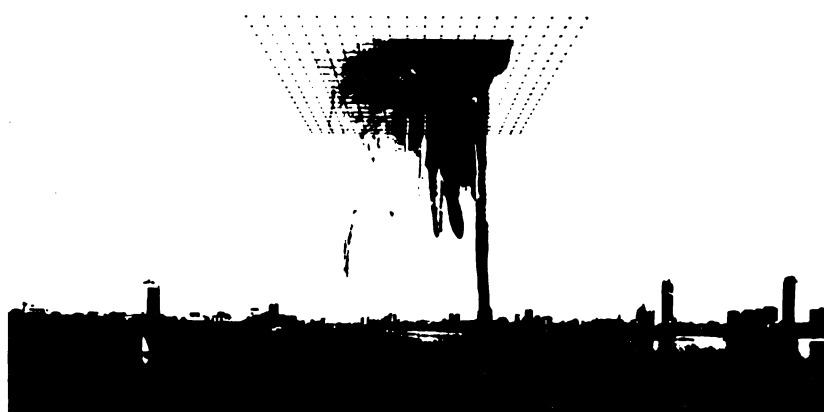
At that time I was fascinated with models — mostly in transportation engineering — that upheld parameters analogous to traditional space definition. The so-called "holding patterns" above congested airports, "waiting rooms" as they are called disaffectionately, have dimensions; floors, ceilings, walls. Their recognition however is given to computers and instrument panels; they are invisible, non-physical entities. Imaginary.

The Stockholm Room was little more than an abstract attempt to translate that phenomenon into the context of a visual exhibit.

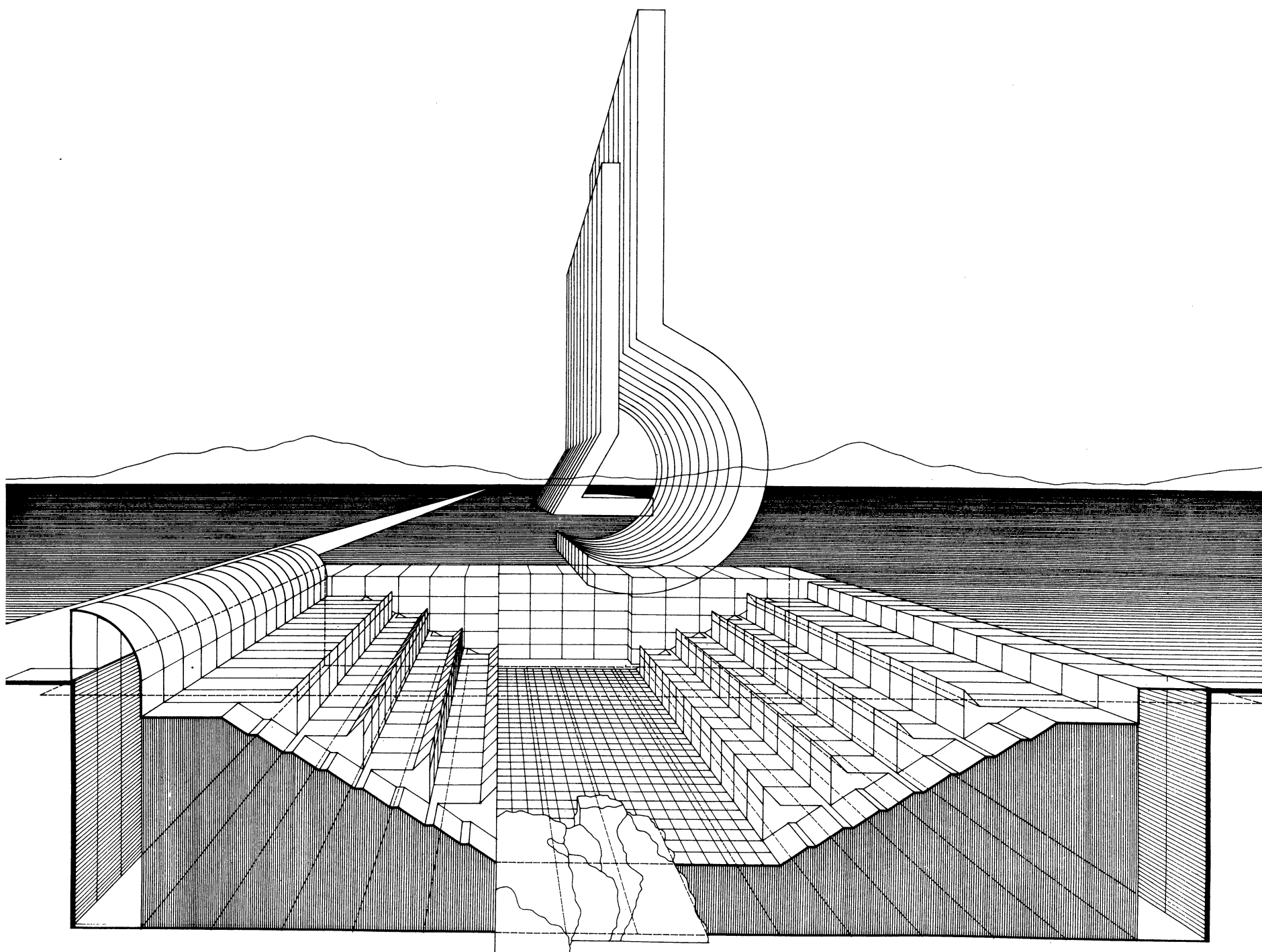
A wall of laser beams created the model of an imaginary room. Not unlike the aircraft that is required to activate the so-called "waiting room," human involvement was required to activate the laser environment: The visitor had to penetrate the room, pass a set of electric eyes which in turn released a shutter in front of the laser unit. Instantaneously the "Imaginary Room" came into being, the visitor could experience it and upon his or her departure, the imaginary room ceased to exist.



"Imaginary Bridge" over the Charles River



"Imaginary Icicles" over the Charles River



"The Imaginary Monument"

steven gregory

cad systems and beyond

U.S. Pavilion, 1984 World's Fair

NETG produced 20 exhibits for the U.S. Pavilion in New Orleans. The exhibits revolve around the central theme of Water. The interactive videodisc stations make use of both touch screen and button interfaces. One exhibit presents a "video aquarium". When a viewer touches any of the fish on the screen, information about that fish is displayed on a separate text monitor. In another exhibit, called "amazing water", the viewer plays a video game in order to learn water facts. The game uses a joystick interface, and sound is provided by the computer and a speech synthesizer. Other exhibits include views of the use of water in agriculture and industry.

Exhibit Designer: Barry Howard & Associates

U.S. Pavilion Paris Air Show

NETG is designing and providing a computerized visitor registration system for the pavilion. The system accepts information from the visitors and stores it for sorting and analysis by the U.S. Pavilion marketing staff.

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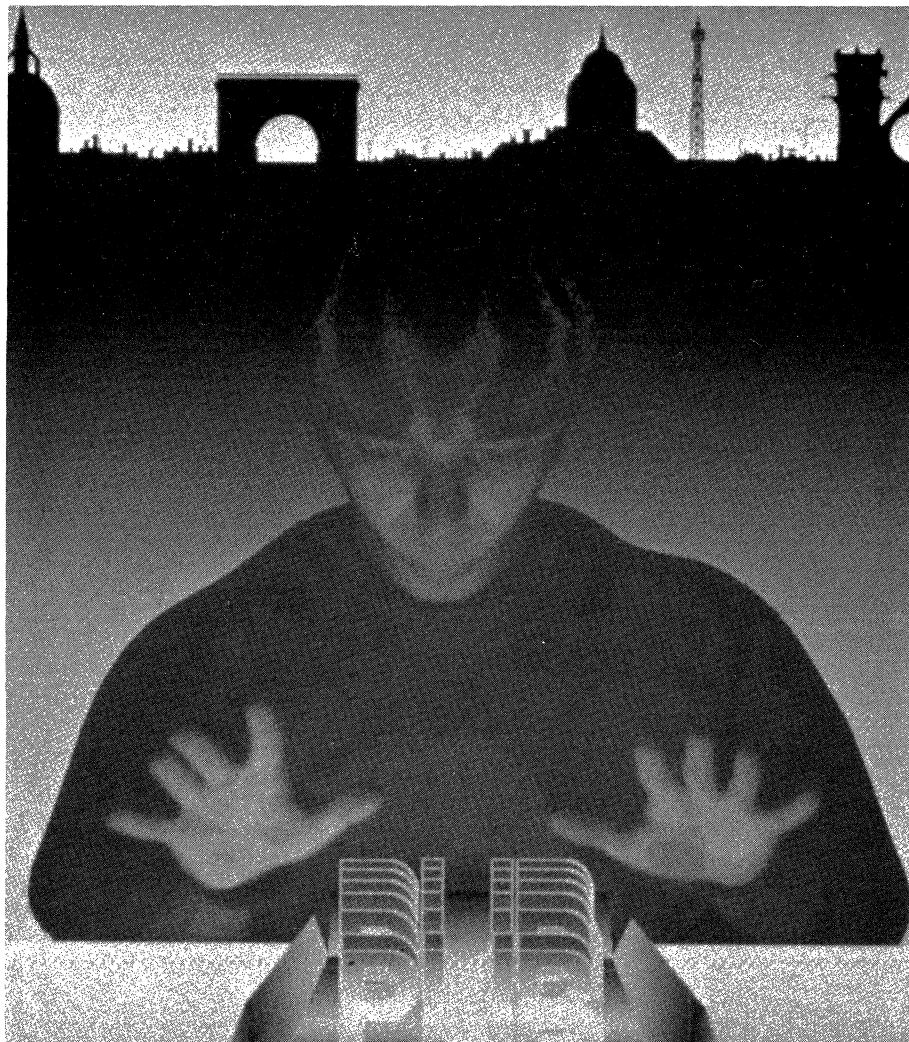
A demonstration of the mechanics of computer graphics in the form of a finger painting station. The exhibit combined NETG's touch sensitive technology with its computer graphics system. A participant can mix colors, zoom in to see the tiniest picture elements, and finger paint with a variety of brushes and colors.

STEVEN K. GREGORY, a computer consultant and President of New England Technology Group, designs CAD systems for architects & develops new electronic technology.

Gregory taught in the Graduate School of Architecture, University of Utah and at M.I.T. where he carried out research in the Architecture Machine Group Laboratory. He also worked on pioneering videodisc projects before forming his own firm.

For the conference he will discuss CAD systems for architects and color graphics for rendering and publication which are emerging as everyday office tools. He will also describe some of the new technology and its implications for designers.

As president of NETG he designed and directed implementation of major projects employing touch screens, local networks, interactive computer graphics and interactive videodiscs.



ed emshwiller

electronic imaging

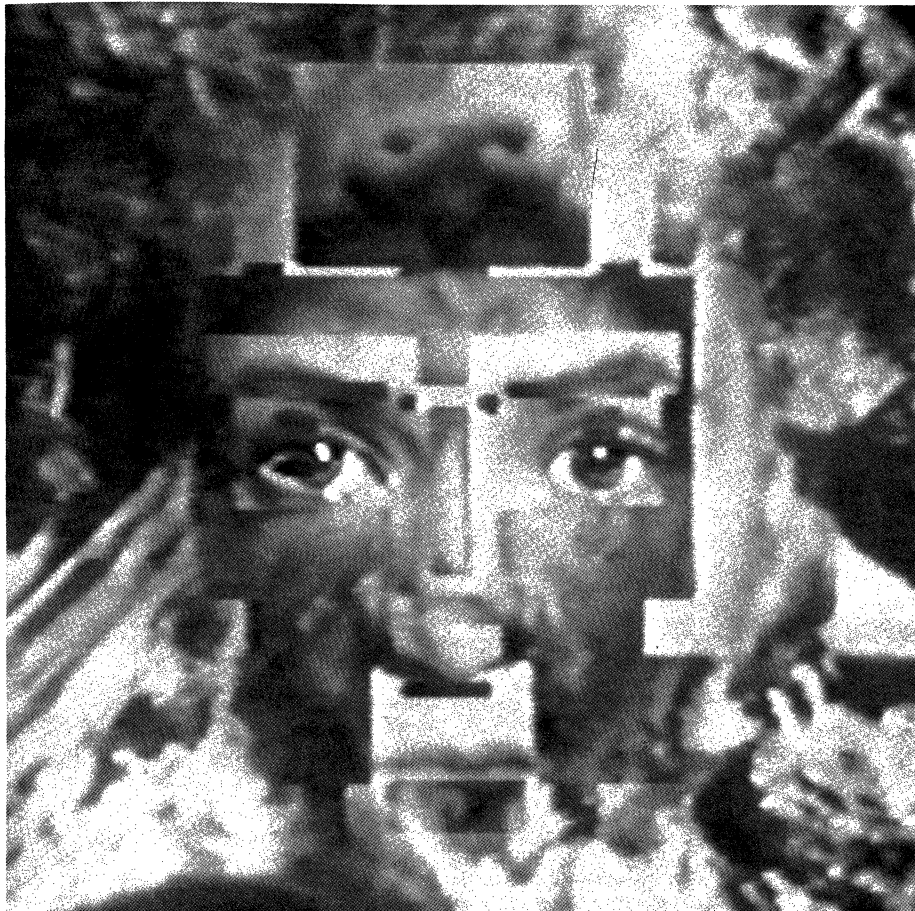
ED EMSHWILLER is a pioneer image maker in film, video and now computers, Dean of the School of Film and Video, Provost, California Institute of the Arts

Image making best describes the range of Ed Emshwiller's work and extensive experimentation. While developing a reputation as an abstract expressionist painter, he was also an illustrator for popular science fiction credited with some 500 covers for books and magazines. During the 60's and 70's he was active in the New American Cinema making experimental films and multi-media performance pieces.

In 1971 Emshwiller made his first videotape and for most of the 70's was an artist-in-residence at the Television Lab, WNET/13 in NYC. Shortly after making SUNSTONE in 1979, his first digital computer video tape, he moved to California as Dean of the School of Film and Video at Cal Arts. Since 1981 he has also been Provost. He has been awarded grants from NEA, Ford, Guggenheim and Rockefeller Foundations. His work has been shown at MOMA, the Whitney and Guggenheim Museums.

Pens, brushes, still cameras, movie cameras, video, computers are tools for artists. All have particular characteristics. All make certain types of images. All cause the artist to think about what and how to do his work. All require knowledge of procedures and the development of manipulative skills.

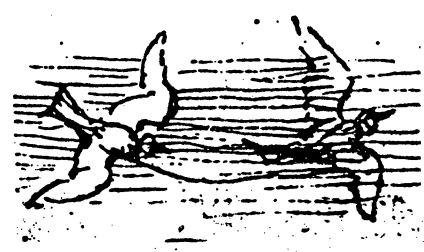
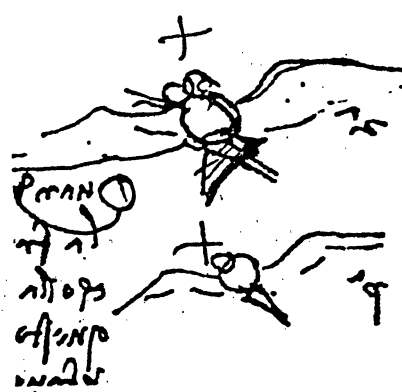
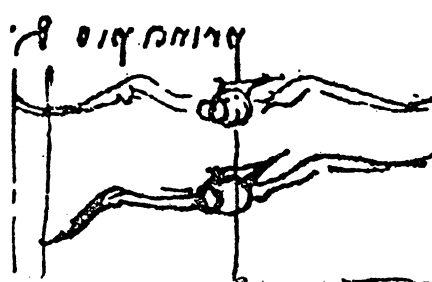
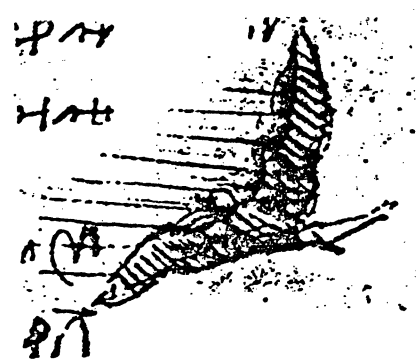
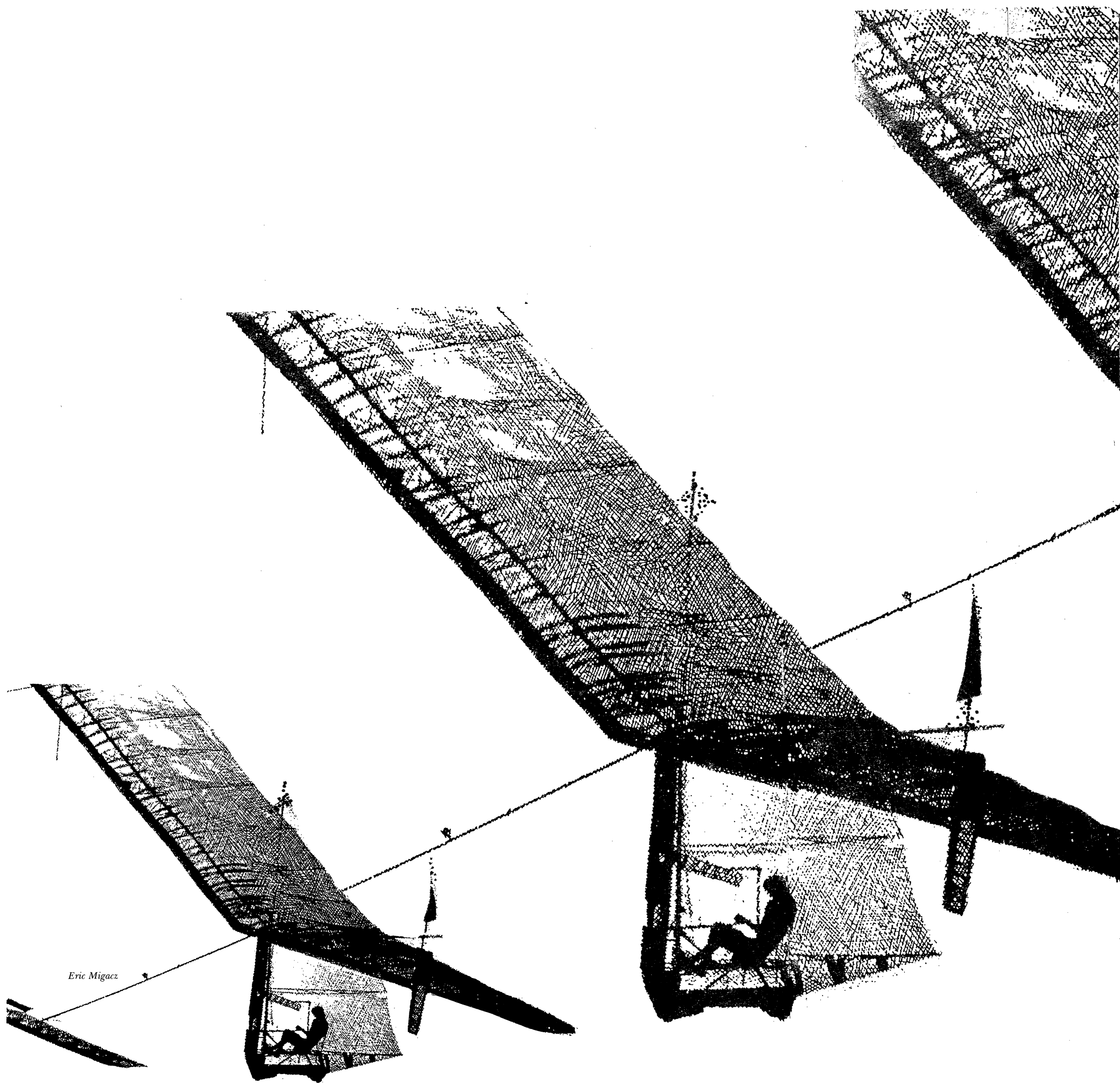
Artists today have mastered a vast array of tools. The possibilities are enormous. One can create images in all sorts of ways. But the basic problem always remains the same, how to make effective art that is "meaningful".

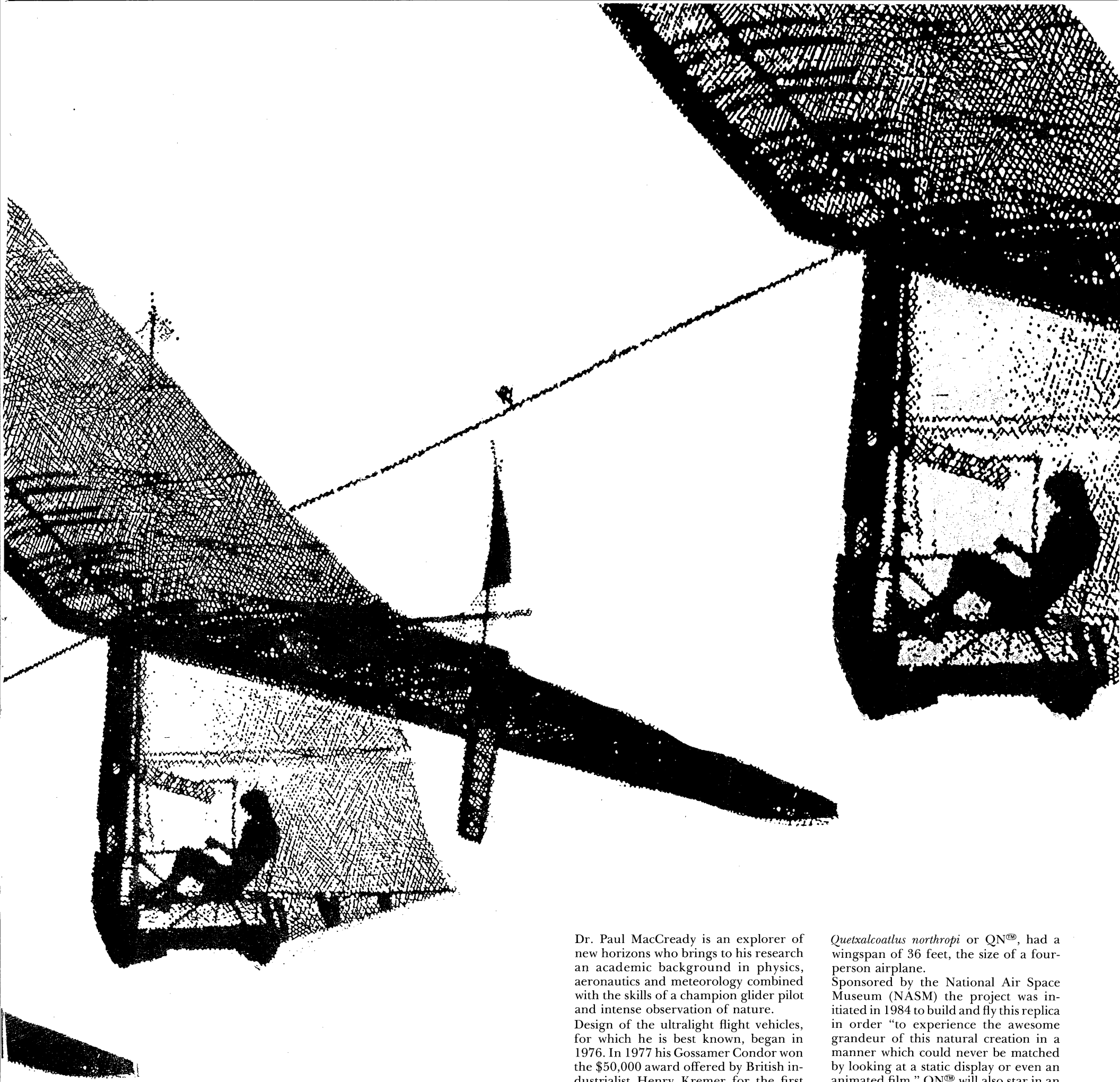


from "Skin Matrix 5", a textured video tapestry

paul mac cready

art and nature in the technology of flight





DR. PAUL MAC CREADY is a developer of human-powered flight, scientist, inventor and aviator, President of AeroVironment Inc., recipient of the ASME "Engineer of the Century Award," Collier Trophy and Lindberg Award

Dr. Paul MacCready is an explorer of new horizons who brings to his research an academic background in physics, aeronautics and meteorology combined with the skills of a champion glider pilot and intense observation of nature.

Design of the ultralight flight vehicles, for which he is best known, began in 1976. In 1977 his Gossamer Condor won the \$50,000 award offered by British industrialist Henry Kremer for the first sustained, controlled human powered flight.

Two years later its successor, the Gossamer Albatross won aviation's largest prize, the \$100,000 Kremer Award for a seemingly impossible human-powered flight from England to France.

The climax of his pioneering in solar powered aircraft was reached in 1981 when his Solar Challenger carried a pilot 163 miles from Paris to England at 11,000 feet. Another of his human-powered airplanes, the Bionic Bat, completed two speed flights in 1984.

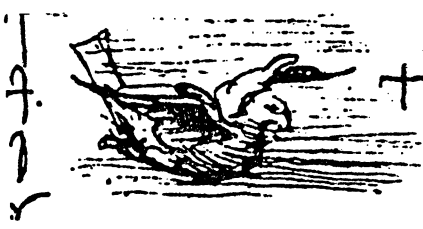
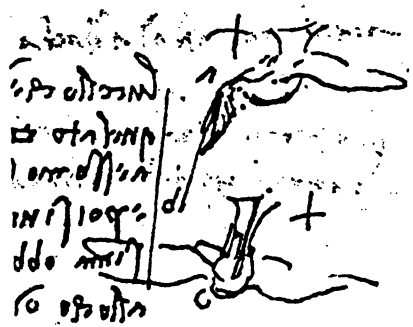
Developing these biologically powered aircraft (operating in the interface between birds and aircraft) and the experience of slow flying aircraft powered by electric motors has led to one of his most challenging projects. He is currently replicating a gigantic pterodactyl, a flying reptile, that lived 65 million years ago in West Texas. The creature, designated as

Quetzalcoatlus northropi or QN[®], had a wingspan of 36 feet, the size of a four-person airplane.

Sponsored by the National Air Space Museum (NASM) the project was initiated in 1984 to build and fly this replica in order "to experience the awesome grandeur of this natural creation in a manner which could never be matched by looking at a static display or even an animated film." QN[®] will also star in an IMAX film, "On the Wing," scheduled for 1986 which will explore the connections between nature's fliers and aircraft. As Dr. MacCready has written:

"Everyone has day-dreamed about being a time traveler, able to observe at first hand events of long ago. We cannot physically go back in time, though at least we can create mental images of the past, and make the images stronger through books and art and moving reconstructions with video and movies.

In making its journey over tens of millions of years, a time period we can quantify but scarcely comprehend, the QN[®] replica — The Time Traveler, will cause us to look more openly and appreciatively at Nature's engineering of flora, fauna, and the earth and cosmos. The biological engineering may seem to occur by random steps, but it results in brilliant solutions to fill ecological niches."



dale eldred

building with time and light

DALE ELDRED is a creator of light sculptures of great scale with installations for museums, ballet and urban spaces. Eldred conceives color not as decoration but as energy or luminous fields. He emphasizes the basic interdependencies of light and shadow, velocity, gravity and time. In executing a particular work he utilizes both the geographical location and the architectural profile of a building or city.

Eldred has had many one-man shows and grants from NEA, Ford and Guggenheim Foundations. In 1970 he was honored by the A.I.A. and in 1982-83 was a Fellow of the Center for Advanced Visual Studies, M.I.T.

I bring to my art something I much admire in others — a sense of adventure. I would walk a long way to see something I'd never seen before in my life. A friend of mine recently pointed out to me that in art that moves there is always this sense of adventure. He used Matisse as a great exemplar, someone who was an innovator, working in a way that was totally independent of what other artists were doing.

Some artists bring a high aesthetic, a polish, rather than invention to their art. We can't say which is better, nor should we try. But the ability to invent, to play, to innovate, is something separate. For that quality Calder has always been very interesting to me. Calder is a totally American sort of phenomenon, a Yankee inventor, A Yankee blacksmith in the arts. I remember approaching a large Calder at M.I.T., an enormous challenge, enormous beyond belief. It seemed incredibly powerful to me, and I thought, "How do you get to this point of view? How do you accomplish something with this sureness and clarity of idea?" Years later, meeting Calder in the south of France, I could see the same sureness and clarity. There was no sense that he was hunting for direction for his vision.

I'm in a period of clarity now. What I create is made between invention and vision. I work with many people. I employ five people full-time, and I use

large installation crews. At the same time, I've always remained a teacher. And it's been important to me to try to keep a hand on all the parts of what I do — the contractor, the financier, the person responsible for securing insurance — so that I can keep understanding them. I don't job it out to somebody else to do. I hold on, because I'm always afraid that I could lose part of the answer to the problems that arise during the days of very difficult installation.

You're facing the physical challenge of going from 5 o'clock in the morning to 12 o'clock at night and then doing it again tomorrow and again the next day, no matter what the weather is like. You're faced with the responsibility for the installation staying up there and not flying off and killing someone on the street.

There's nothing random in what I do. After all, this work is about time, about the fourth dimension. What I do is totally locked into real time. For example, the work on the north face of the Minneapolis Institute of Art functions very precisely with the passage of light that crosses there exactly at twelve o'clock noon. The board across the north face is a red fluorescent which is light reactive material. Across from it, I'm using two south-facing mirror banks. The mirrors are set at exactly a proper declination to the sun. At twelve o'clock, the sun strikes the mirrors and the mirrors direct the

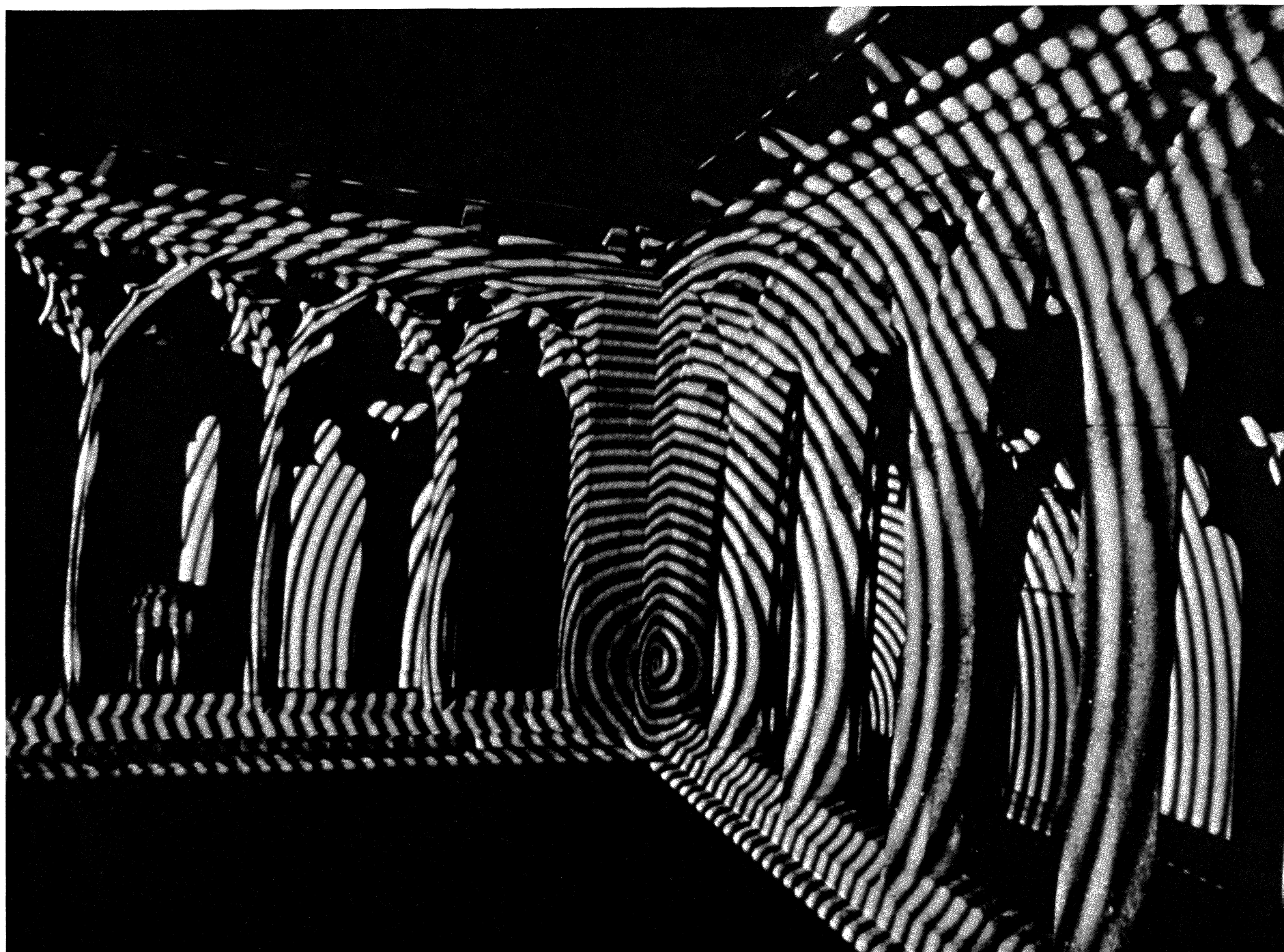
light back to the fluorescent board. The viewer can stand in this passageway and observe. It's built to arch over automobiles. The light "tracks" across the red board in a period of focus for five minutes. You can stand there and take in the view and say, "Gee, that's beautiful." If you stop for a bit, you might realize that you're watching the rotation of the earth. A very ancient ritual, one that goes back to the Mayans and to the Plains Indians.

When you look at the diffraction wall that's placed 50+ stories up on the roof of the Multifoods Tower in Minneapolis, on a sunny day you're looking at the wavelength of light. It's really a phenomenon in that what you're looking at is light, pure light, the essence of light, visible in its prismatic form, up to 22 miles away. The turning of the earth and the resulting change in our position relative to the sun is visibly recorded on the sculpture's surface as one color fades slowly into the background while the succeeding color in the spectrum bursts forth in brilliant focus.

It's important that people make a distinction between the art and the instruments that make the art possible. The engineering makes the art possible, puts it into position to happen. It's the idea that interests me, though, the realization of relationship that comes out of the art. If there's anything I would put forth as

my vision, it is man's relationship in his universe. And that relationship is made clearer by what I might put together. When I come back to photograph an installation, I'll sometimes see one person standing near that mirror board, standing there, looking. He looks at the board, looks at the mirrors, looks at the sky. And the connection is made. There's that little bit of contemplation. My work is not about huge masses. It's about one individual, standing and viewing, seeing so much at one particular moment.

And what the viewer sees at any particular moment is unique, totally, absolutely unique at the moment, because even if you return at the same time the next day, it cannot be the same, because everything in the cosmos is going through minute change. This work is about the nature of physics; this work is about the nature of nature.



Medieval Cloisters, 1979. Nelson-Atkins Museum of Art, Kansas City

otto piene

art/science/technology

iconoclast

Listening to a certain whole breed of professors and reading their books, one has to conclude that their only solution for the role of art in architecture, nature and technology, vis-a-vis a numerically growing society, is design, i.e. the narrow version of what design can be, based on narrow and academic interpretations of Bauhaus principles. It all boils down to the artist's role as designer of pots and pans, letterheads and magazines, maker of artsy-craftsy films and holder of the architect's hand while he is thinking about how to artfully scratch-pattern the skin of his buildings.

First of all, design can mean everything the highest as well as the lowest. So let's not worry about the word "design." More important: restricting the artist's activities to functional design takes away one of his innate concerns, representation, expression, interpretation of life through drawing the human appearance in whatever conceivable technique, be it pencil drawing or electronic casting by means of television. Puristic styles in the arts such as (big deal) minimal art, owe the attention paid to them now to the fact that they occurred before the background of thousands of movies animated by celluloid equivalents of human beings. On the other hand; imagine movies that were analogous to primary structures — how lively modern sculpture would be.

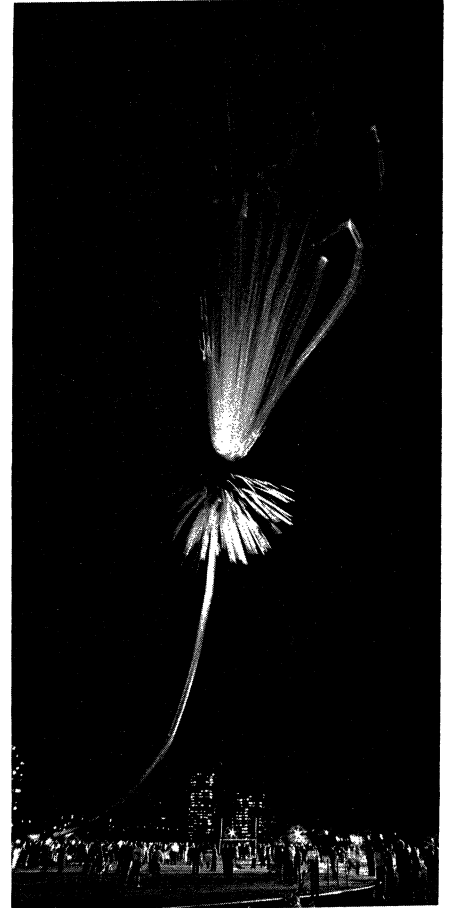
Aside from that the real inhabitant of the new artistic environment, iconoclastic or not, is every human being in it. The fact that men and women, especially boys and girls, dress more colorfully and let their hair grow more sculpturally, emphasizes the importance of the voluntary individual versus the classified stereotype. . . .

Sometimes I think that a 250-story building bearing the shape and colors of Sitting Bull might make just as much sense as the World Trade Center, especially 10 years after the Seagram building.

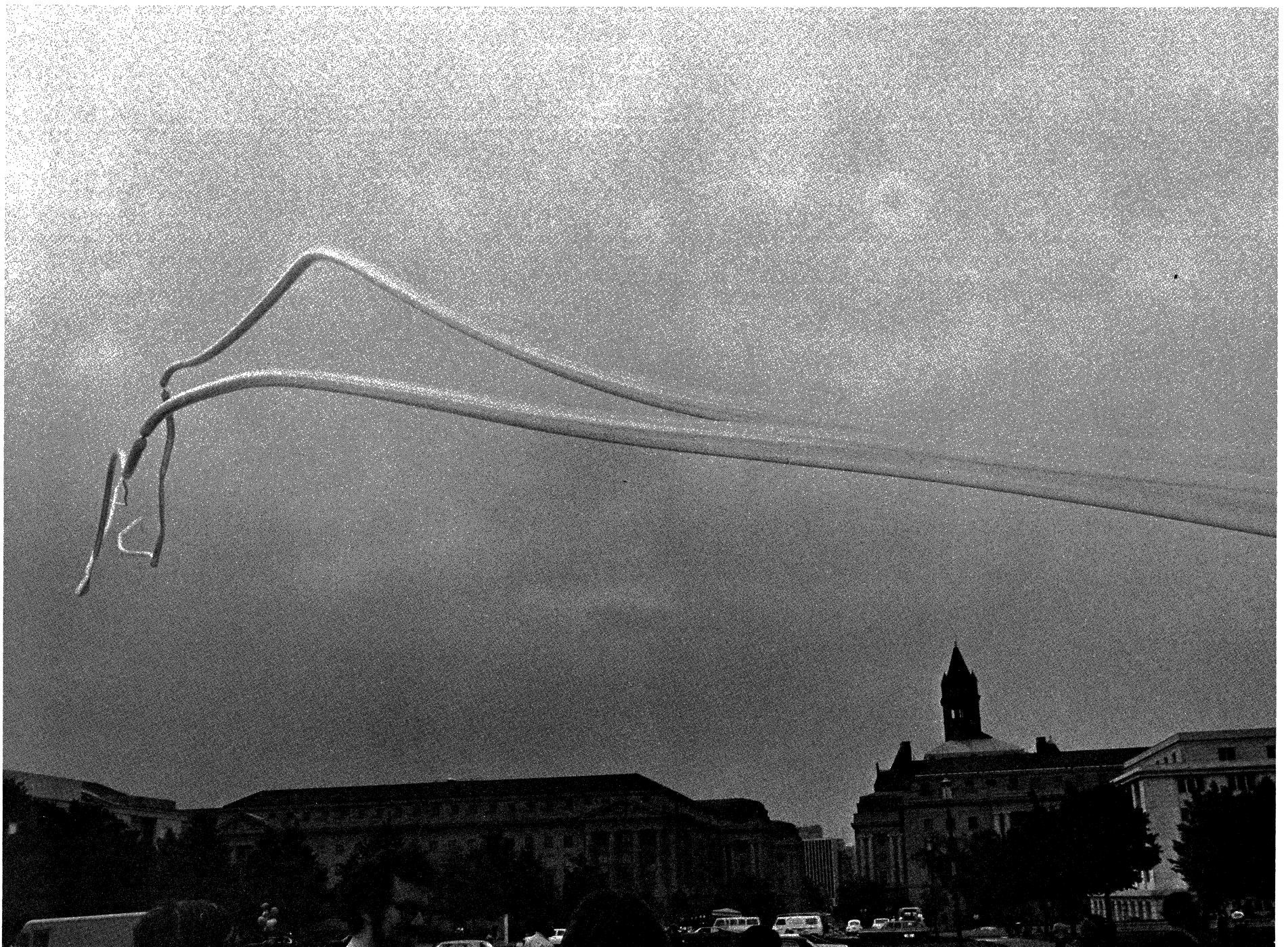
OTTO PIENE is an environmental artist, Director of the Center for Advanced Visual Studies creator of helium-filled inflatable sculpture for sky art projects.

Although Piene works in several media and for interior spaces, he is best known for his sky art projects executed in the U.S., Mexico, Germany and Austria. He looks upon his work as celebrations, socially interactive, and of brief duration. Carnivals, coronations, fairs and festivals come to mind, particularly with reference to his Olympic Rainbow of 1972 which closed the Munich Games.

His inflatables and sky events attempt to point out the new dimension of nature, life, science and art.



Blue Star Linz 1980



Washington Sky Event, 1970

larry albright

ionized gases as an art form

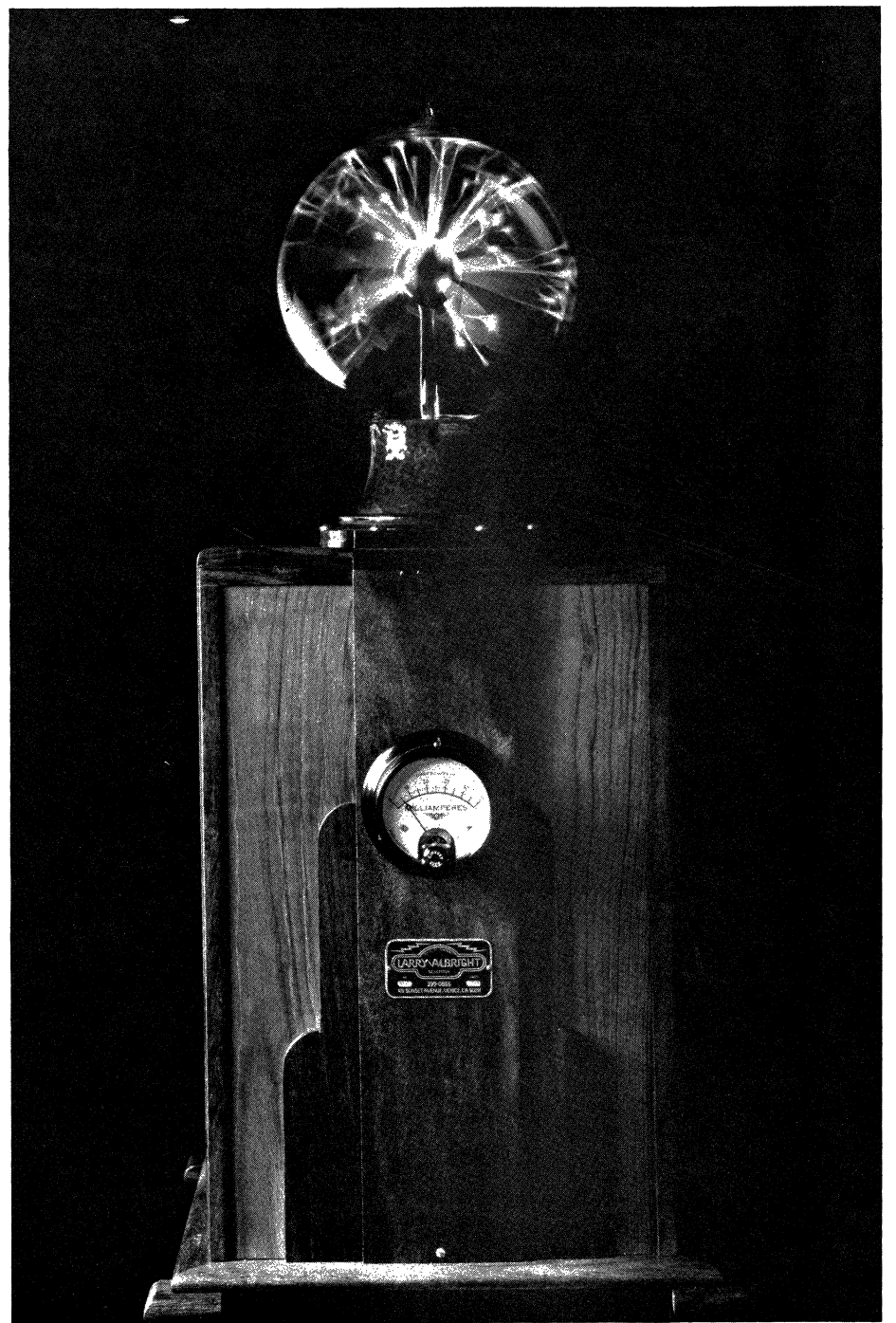
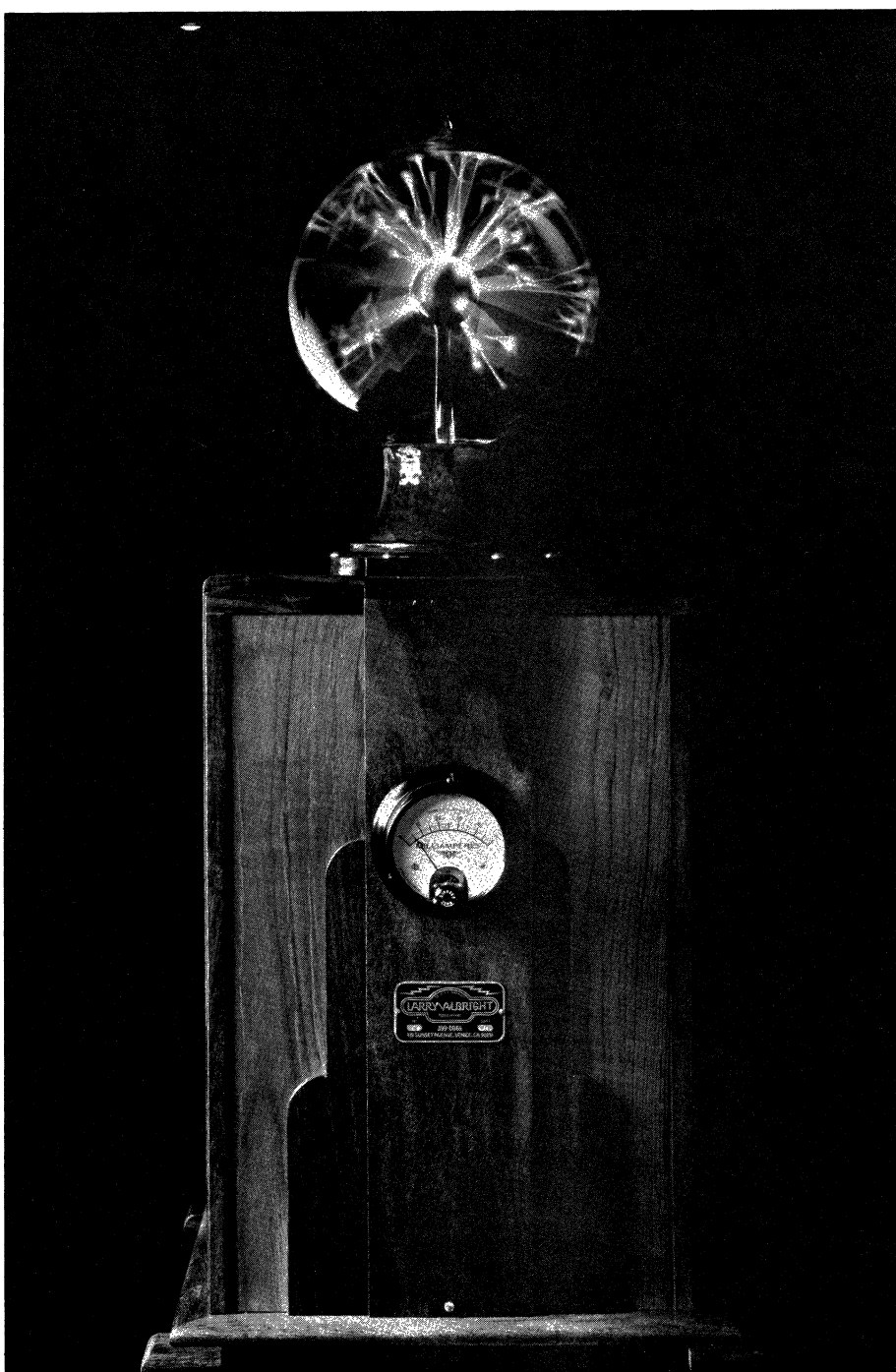
LARRY ALBRIGHT is a sculptor who employs ionized gases in his kinetic sculptures. While Albright employs new and sophisticated media, his interest is not in novelty but in recreating a sense of wonder about the way things work. He studied photography with Ansel Adams, engineering at Oklahoma A&M and electronics while in the Navy. Albright is well known for his photography and neon art with many exhibitions of his work throughout California. He is also recipient of an NEA grant.

With his unique combination of skills, he is a frequent consultant on motion picture special effects. Some of his credits include: Close Encounters of the Third Kind; Star Trek-The Motion Picture (Part I); 1941-The Rising Sun; Battle Beyond the Stars; One From the Heart.

ART STATEMENT

WHAT ARTISTS SAY ABOUT THEIR WORK OFTEN DOES MORE TO OBSCURE THEIR ART THAN TO CLARIFY IT. WITH THIS IN MIND I AM GOING TO BE BRIEF, AND HOPEFULLY TO THE POINT. I WORK OUT OF MY PERSONAL VALUES AND A GENUINE LOVE FOR THE EARLY DAYS OF SCIENCE WHEN THERE WAS AN HONESTY AND PURE WONDER ABOUT THE WAY THINGS WORKED. OBJECTS WERE BUILT AS DEMONSTRATION APPARATUS FOR THE MARVELS OF NATURE, WITH CARE BEING TAKEN IN THE BUILDING OF THE OBJECTS WHICH SEEMED LIKE MARVELOUS SCULPTURES IN THEMSELVES. ROSEWOOD AND OAK TURNED ON LATHES TO MAKE FINIALS AND TRIM COMBINED WITH KNURLED BRASS KNOBS, CREATED OBJECTS THAT THRILLED ME AS A YOUTH AND NOW I COLLECT SOME EXAMPLES OF THESE THINGS AS CHANCE ALLOWS.

IN THE SCULPTURES I BUILD, THE BEST QUALITIES OF OLD ELECTRICAL MACHINES ARE REFLECTED: IN THE USE OF A FEW OLD METERS, A TOUCH OR TWO OF ANTIQUE HARDWARE COMBINED WITH NEW MATERIALS OF THE SAME INTEGRITY. SOMETIMES A GAS DISCHARGE GLOBE OR AN INTRICATE PIECE OF GLASSWARE FILLED WITH RARE GASES TO PROVIDE SOME FORM OF "MAGIC" WHICH IS ALWAYS PRESENT.



Untitled

kurt nassau

15 ways of generating color

DR. KURT NASSAU is a Research scientist for Bell Laboratories, author of "The Physics and Chemistry of Color, the Fifteen Causes of Color".

Being both physicist and chemist, Dr. Nassau's research has been extensive in scope. At the AT&T Bell Laboratories he has concentrated on the growth and properties of crystals for lasers, ferroelectrics, optics and other solid state fields, on glasses for ionic conductivity and for optical fiber communication.

Dr. Nassau's interest in various aspects of gemstone synthesis, identification and alteration led to his publications on all the causes of color. In addition to 14 patents, 295 publications, three books and frequent lectures, he has

received many honors from professional societies. As one might suspect he is also a great chess player and photographer.



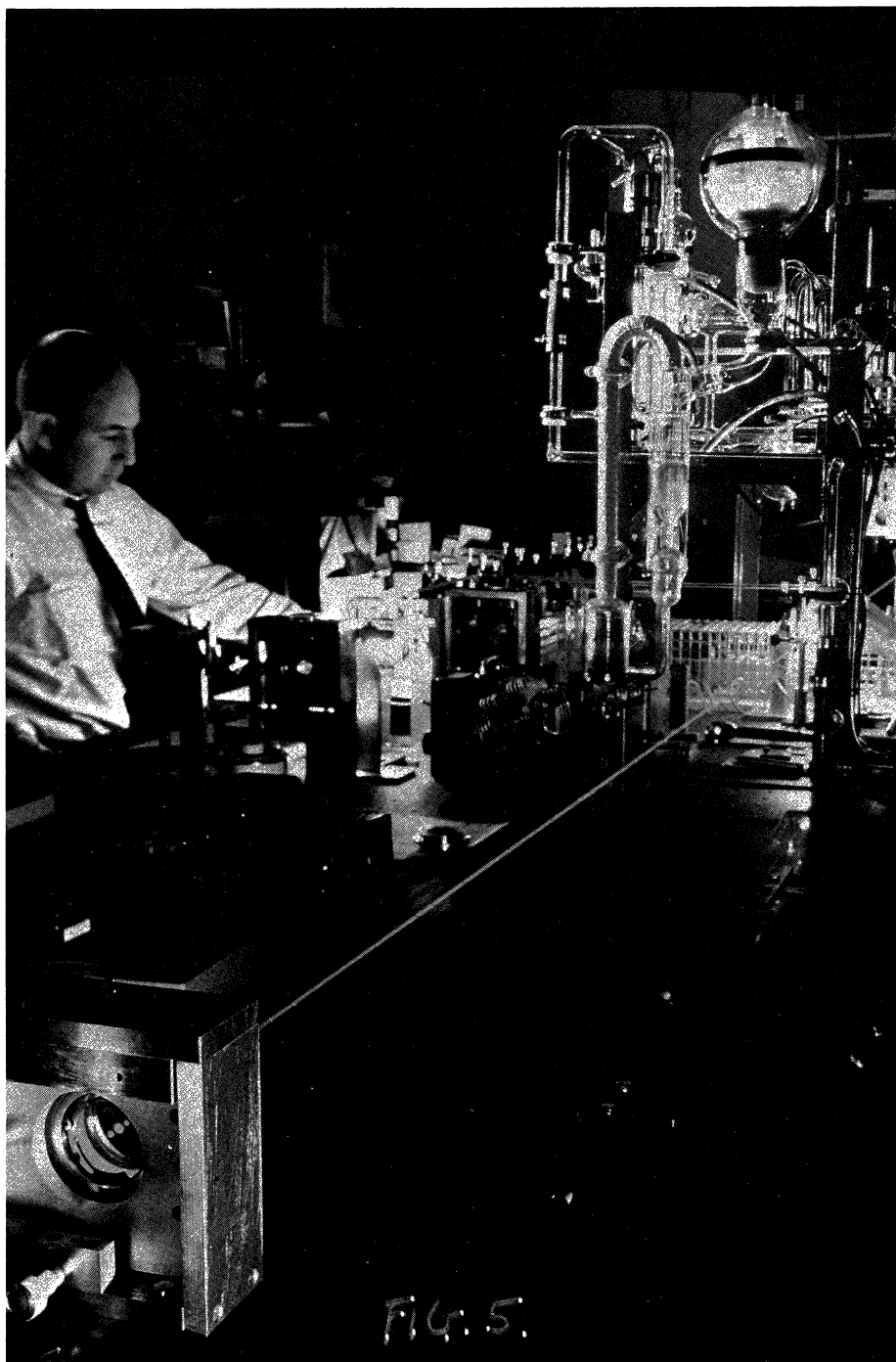
Photoelastic stress anyalysis of a model of Notre Dame

Leigh Hunt says that "Colors are the smiles of nature" and for Ruskin "The purest and most thoughtful minds are those that love color the most." The inquiring mind will wonder where colors originate. The first causes that come to mind are transition metal compounds, organic dyes, and the dispersion which produces the rainbow. There are, however, a total of fifteen causes, with their roots in varied branches of physics and chemistry. Detailed discussions of some of these causes are to be found only in highly specialized texts, yet simpler descriptions such as those given in "The Physics of Chemistry of Color", (K. Nassau, Wiley, 1983) can yield considerable insight and intensify appreciation of color. These fifteen causes can be summarized as follows:

1. *Dispersive refraction*, the differential bending in all matter of light of different colors, produces the rainbow, sun dogs and halos around the sun and moon, the green flash, and the "fire" in a faceted diamond.
2. *Incandescence* of any substance at elevated temperatures produces colored light in the sequence black to red to orange to yellow to white to bluish white as in flames, lamps, and lightning.
3. *Vibrations and rotations* in atoms and molecules give the blue colors to water, ice, and a gas flame.
4. *Gas excitations* produce colored light from unpaired electrons in "atomic orbitals" as in mercury and sodium vapor lamps, in neon tubes, and in the aurora.
5. *Transition metal compounds* containing unpaired electrons in a "ligand field" environment provide us with many pigments such as chrome green and gemstones such as azurite and turquoise.
6. *Transition metal impurities* present in otherwise colorless substances similarly provide color in gemstones, such as the red of ruby and the green of emerald, both caused by chromium, and in colored plastics and glasses.
7. *Organic compounds* of many types contain unpaired electrons in "molecular orbital"; they provide the color of most

dyes and most biological colorations in our flora and fauna.

8. *Charge transfer colors* involve special electronic interactions, often between two transition atoms, leading to the color in gemstones such as blue sapphire and in pigments such as Prussian blue, ultramarine (lapis lazuli) and chrome yellow and orange.
 9. *Metals* derive their color from electrons in "bands"; this explains the color of gold, silver, copper, brass, and so on; also here included in the color of "ruby" glass.
 10. *Pure semiconductors* have colors derived from a "gap" in their "band", leading to the color sequence colorless (diamond), yellow (cadmium yellow), orange (cadmium orange), red (vermillion — cinnabar), and black (galena).
 11. *Impurities in semiconductors*, present in as little as one atom per million, produce "impurity energy levels" within the "band gap," leading to the colors in blue and yellow diamonds and the colors of light emitting diodes.
 12. *Color centers*, which can color many crystals and glasses, are usually produced by energetic radiation which unpairs electrons; examples are smoky quartz, amethyst, blue and brown topaz, and amethyst "desert" glass.
 13. *Scattering* of light by small particles leads to the blue of the sky and the red of the sunset, to blue eyes, pink skin, white clouds, and so on.
 14. *Interference* of beams of light leads to the iridescent colors of the oil slick, of coatings on camera lenses, and some animal colorations as in butterfly wings and bird feathers.
 15. *Diffraction* also involves interference of light and leads to atmospheric effects such as the aureole around the sun and the glory seen around our shadow, some animal colorations, and the "play of fire" in the gemstone opal.
- For all but one of these causes it is the interaction of light with electrons that produces the color, and we can thus "see" electrons in a very real sense.



At work with Lasers, Courtesy of AT&T Bell Laboratories

joan truckenbrod

creative computer imaging

JOAN TRUCKENBROD is a computer artist, Head, Art & Technology, The School of the Art Institute of Chicago. Truckenbrod is nationally known for her use of the computer in diverse ways, often synthesizing abstracted digital images with realistic ones. Her imagery may be preserved in photographs or using ink jet pointers expanded to an environmental scale for her large printed cloth tapestries. Whether as artist or teacher she is concerned with using the computer as both stimulus and tool for creating art. Her work has appeared in many exhibitions and publications.

New directions in visual imagery emerge as artists use computer graphics systems as a means of expression. The foreignness of computing in the arts challenges artists to explore new approaches and develop new techniques for creating visual imagery with electronic technology. Traditional image making techniques, utilize the character of paint and drawing media but do not correspond to the nature of computer imaging systems. New media must be used in ways that are consistent with the intrinsic character and peculiarities of computing systems. Computing devices expand the context of visual expression and communication, suggesting new imagery in conjunction with a creative process that integrates analytical thought processes with intuitive decision making. Computing systems provide a wide variety of graphic options that, when combined in different ways in the imaging process, create layers of ideas in complex visual fields. Computing devices expand the scope of artistic expression, propelling artists into new frontiers of thought and image synthesis. Computer imaging is a multifaceted creative process, involving a series of stages. The artists chooses various imaging alternatives and combines options in each phase of the process. The variety of image creation and manipulation options provides artists with a prolific imaging system. The character of the final

image varies significantly, depending on the series of options chosen in each phase of the process.

There are three basic stages in the computer imaging process. The initial stage is the INPUT phase, in which the artist creates an image and communicates it to the computer. In order to describe an image or idea for use with computing devices, it must be translated into a digital format or data set. Delightful devices such as video digitizers and digitizing tablets bridge the visual/hand orientation of the artist and the digital nature of the computer, providing the necessary communication link. These devices allow artists to initiate imagery with familiar media, such as a video camera and a sketch pad, and expand the scope of the idea with the unique capabilities and visual characteristics of the computing system. Other input devices include light pens, three dimensional digitizers, hand held mouse devices and the traditional keyboard.

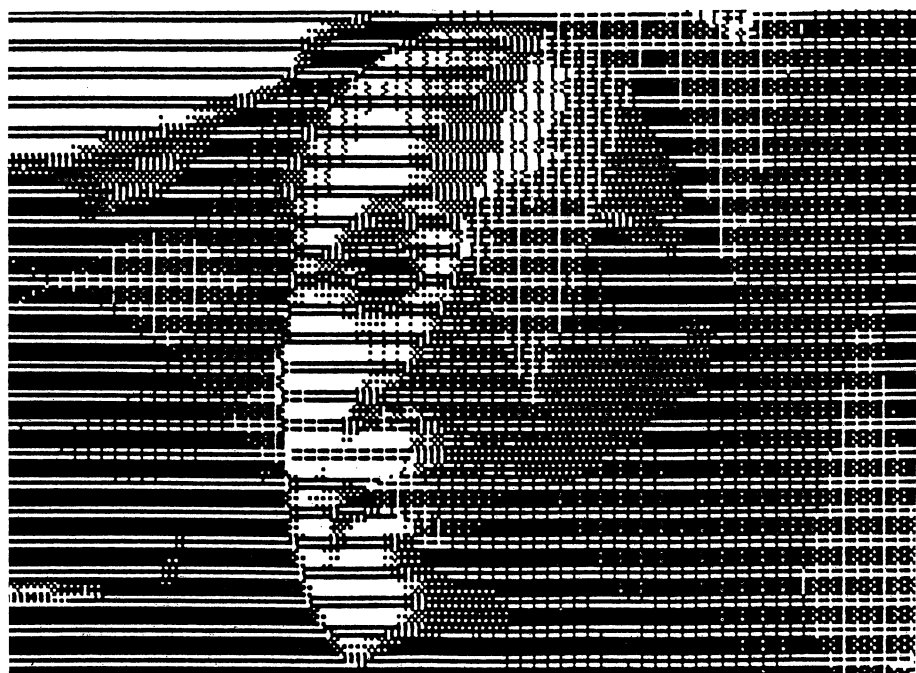
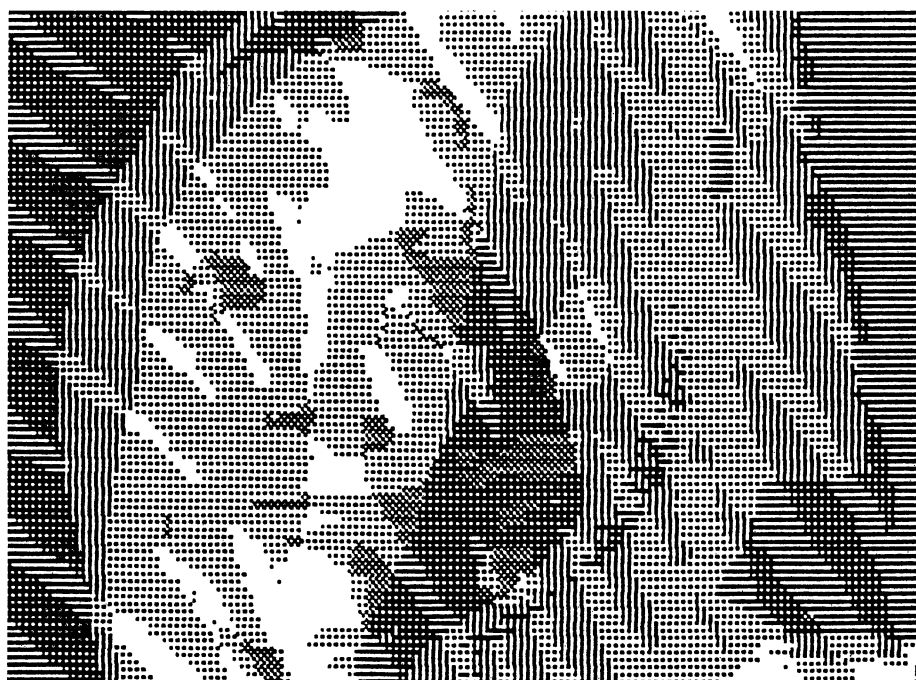
A variety of image distortions such as stretching, compressing, fragmenting and image abstraction are accomplished with the aid of input devices. The character of the image created in the input phase reflects the nature and capabilities of the device or series of input devices used in the process of creating the image. The second phase is the computing or PROCESSING stage, in which a wide

variety of operations can be performed, with the aid of computer programs or software. Graphics programs facilitate figure rotation, scaling, translation and image transformation or distortion. These operations are used simultaneously to create animated images. Colors can be changed to create dynamic visual effects. Merging and repeating images generate unusual patterns or compositions. A multitude of image manipulation and transformation effects can occur simultaneously, as computers can change a wide range of variables at the same time. The potential of a multivariant imaging environment is unlimited.

The OUTPUT phase is the third component of the imaging process. A variety of interesting output devices include color video display, dot matrix printers, color ink-jet printers, pen plotters, and color photographic devices of making prints or slides.

During the output process, colors can be modified and the proportional size of the image can be changed. Each of these devices have visual characteristics that contribute to the visual dynamics of an image. The computer holds an image as a data set, seemingly in a "fluid" state, without any physical definition. The artist has the opportunity to implement or materialize the image in a wide variety of media. The nature of a digital image al-

lows artists to propel their ideas into the world through a multiplicity of forms. The artist, synthesizing ideas through computing systems, chooses imaging options in each of the stages of the process that contributes to and impacts the character of the visual dynamics. The complexity and sophistication of computer graphics systems requires an innovative approach to imaging that integrates the creative, intellectual and intuitive faculties of an artist. Multidimensional computer imagery will evolve as artists assimilate and synthesize the character and capabilities of computing systems. Insights of the creative spirit shape the direction of computer imaging.





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Kettle with small bird-shaped whistle—Michael Graves, 1985

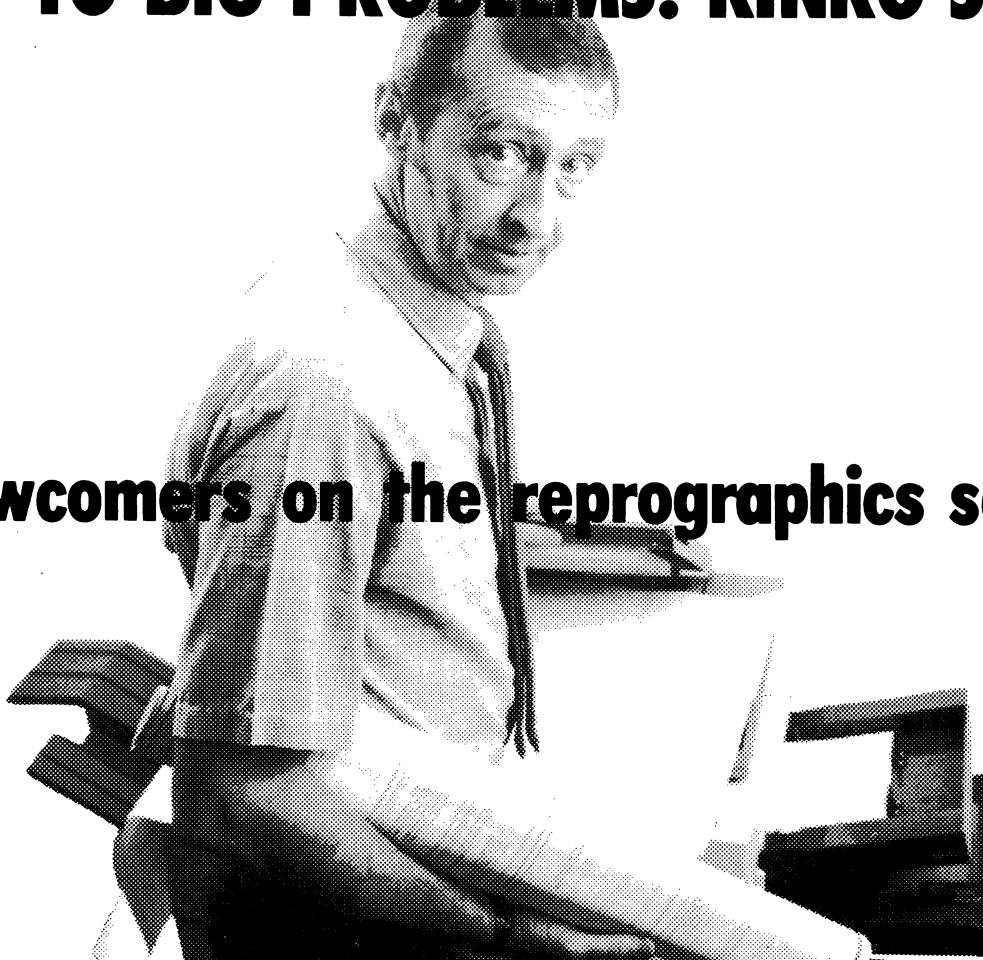


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'56 — **Ken Long** recently moved his firm, Kenneth D. Long & Associates, to larger offices in Seattle where he is involved in numerous shopping, office building, and business/high tech park projects.

'60 — **Gene Carr** has received the infrequently-given Morris Johnson Distinguished Planner Award from the Utah APA Chapter. The presentation was made at the state annual conference held in May at Provo, Utah.

'60 — **Robert Morris, Jr.**, president of his San Francisco-based consulting firm, has published an article, "A/V Design: Getting it Right," in April 1985 issue of Facilities Planning News, a Calif. Tradeline publication.

'62 — **Stan Elmer**, Bountiful, has combined his education in architecture with public administration and geography for a career in planning. He has worked for 20 years with the Department of Natural Resources and is currently Field Operations Planner for the Divi-

sion of State Lands and Forestry. He is president of the Utah Section of the American Water Resources Association, a national scientific and educational organization.

'63 — **Ralph Evans** has redesigned and renovated a 1909 home in the avenues of Salt Lake City for a personal residence. The bungalow was featured on the cover of the February 1985 issue of Sunset magazine.

'67 — **Nick Kontas** is in practice with John Giusti, former GSA faculty member, in Colorado Springs. He reports there is much construction but a very competitive market with many architectural firms relocating in Colorado from other parts of the country.

'67 — **Steve Masini** has recently moved his firm, Masini, Sanford, Gabrielse and Schoenfeldt Architects, to a new location in Olympia, Wash.

'69 — **Jerry Germer** is a contributing associate editor for architecture of Solar Age, a national

monthly magazine published in New Hampshire.

'70 — **Bob Walker** has done a series of paintings of the Four Corners area of Utah and has printed lithographs of two of them.

'71 — **Kathy Vernon**, specializing in mental retardation and corrections facilities for the state of Connecticut, has been named a steering committee member of the National AIA/Architects in Government committee on which she has served for several years.

'75 — **Steve Crane and Kimball Shaw** ('81) have formed Steve Crane Associates with offices in Salt Lake City.

'76 — **Bill Foucher**, after several years of hospital planning and designing with computers, is working for Aspostolicas Properties, Concord, N.H., providing in-house design services and integrating computers into all phases of operations of the commercial development firm.

NEW TECHNOLOGIES OF ART, OCTOBER 25-26, 1985

Please detach the Registration Form below and return it, along with your check made payable to The Contemporary Arts Group, to: Dan Burke, Utah Arts Council, 617 East South Temple, Salt Lake City, UT 84102, (801) 533-5757. *Registration deadline is October 15.*

Registration Form

Name _____

Please indicate:

____ artist ____ scientist ____ engineer ____ other

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Registration Fees:

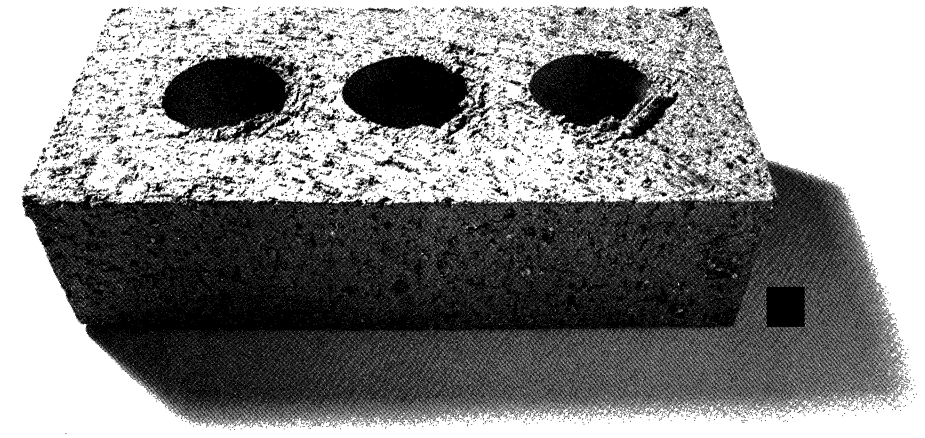
Contemporary Arts Group Member & Students*	\$20 _____
Non-member Registration*	\$35 _____
Paul MacCready Lecture Only (Friday 8 p.m.)	\$ 5 _____

*Registration fee includes Paul MacCready Lecture, all Saturday activities and a box lunch.

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